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# Gender differences in the effects of deployment-related stressors and pre-deployment risk factors on the development of PTSD symptoms in National Guard Soldiers deployed to Iraq and Afghanistan☆

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ABSTRACT

*Objective:* Although women in the military are exposed to combat and its aftermath, little is known about whether combat as well as pre-deployment risk/protective factors differentially predict post-deployment PTSD symptoms among women compared to men. The current study assesses the influence of combat-related stressors and pre-deployment risk/protective factors on women's risk of developing PTSD symptoms following deployment relative to men's risk.

*Method:* Participants were 801 US National Guard Soldiers (712 men, 89 women) deployed to Iraq or Afghanistan who completed measures of potential risk/protective factors and PTSD symptoms one month before deployment (Time 1) and measures of deployment-related stressors and PTSD symptoms about 2–3 months after returning from deployment (Time 2).

*Results:* Men reported greater exposure to combat situations than women, while women reported greater sexual stressors during deployment than men. Exposure to the aftermath of combat (e.g., witnessing injured/dying people) did not differ by gender. At Time 2, women reported more severe PTSD symptoms and higher rates of probable PTSD than did men. Gender remained a predictor of higher PTSD symptoms after accounting for pre-deployment symptoms, prior interpersonal victimization, and combat related stressors. Gender moderated the association between several risk factors (combat-related stressors, prior interpersonal victimization, lack of unit support and pre-deployment concerns about life/family disruptions) and post-deployment PTSD symptoms.

*Conclusions:* Elevated PTSD symptoms among female service members were not explained simply by gender differences in pre-deployment or deployment-related risk factors. Combat related stressors, prior interpersonal victimization, and pre-deployment concerns about life and family disruptions during deployment were differentially associated with greater post-deployment PTSD symptoms for women than men.



The extent of female service members' participation in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) has been unprecedented relative to past conflicts, with women accounting for over 11% of all deployed US troops (Department of Defense, 2009). Although the Department of Defense only recently lifted the ban on women serving combat roles in the US military, blurred distinctions between combat and combat-support duties in OEF/OIF have increased women's likelihood of being exposed to combat and their risk of developing post-deployment



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mental health disorders (Seelig et al., 2012). This highlights a notable gap in existing research on combat exposure and post-traumatic stress disorder (PTSD) (Hoge et al., 2004; Schlenger et al, 2007; Street et al., 2009) – namely, a near-exclusive focus on men despite evidence women may be at greater risk for PTSD than men (Tolin and Foa, 2006). Epidemiologic studies consistently show higher rates of PTSD among civilian women than men (Kessler et al., 2005; Tolin and Foa, 2006), and evidence emerging from large studies of military personnel deployed to OEF/OIF has largely paralleled civilian findings (Schell and Marshall, 2008; Smith et al., 2008a; Woodhead et al., 2012).

Several explanations have been put forth to account for observed gender differences in rates of post-deployment PTSD in US military populations. First, women and men may differ in their vulnerability to combat-related stressors (Street et al., 2009). Consistent with the civilian literature indicating women are at greater risk for PTSD than men following a variety of traumatic events (Tolin and Foa, 2006), this explanation suggests a moderation or interaction effect by which the impact of combat-related stressors on post-deployment PTSD varies by gender. A second potential explanation is that women and men may differ on risk/protective factors (e.g., unit support, military sexual trauma) present prior to or during deployment that may account for apparent gender disparities in rates of post-deployment PTSD (Hoge et al., 2007). According to this explanation, when other risk/protective factors are accounted for, gender differences in post-deployment PTSD symptoms should disappear. Finally, gender may moderate the effect of pre-existing risk/protective factors on the development of post-deployment PTSD symptoms. For example, the association between risk/protective factors (e.g., prior interpersonal victimization, unit support) and post-deployment PTSD symptoms may vary for women and men (Street et al., 2009).

Few studies have compared the deployment experiences of women and men, but women have generally reported slightly less combat exposure than men deployed to Iraq and Afghanistan (Street et al., 2009; Vogt et al., 2011b; Woodhead et al., 2012). Unfortunately, women are more likely than men to experience a range of sexual stressors during deployment (Maguen et al., 2012b; Street et al., 2013). Findings from the Millenium Cohort Study show women who deployed to OEF/OIF and were exposed to combat were significantly more likely to report sexual stressors compared to women who did not deploy (Leardmann et al., 2013). Among OEF/OIF veterans seeking VA care, 31% of women with PTSD compared to 1% of men with PTSD screened positive for military sexual trauma (Maguen et al., 2012a). These findings underscore the importance of examining exposure to deployment sexual stressors when considering the impact of combat-related stressors on women and men (Street et al., 2013).

Studies of service members deployed in support of OEF/OIF have recently examined whether combat and other deployment stressors affect women and men differently. Luxton and colleagues found combat exposure was more strongly associated with post-deployment PTSD symptoms for women compared to men (Luxton et al., 2010). However, after controlling for reports of prior life stressors and sexual harassment during deployment, Vogt and colleagues found no gender differences in the association between several types of deployment stressors (including combat exposure) and PTSD (Vogt et al., 2011b). In a retrospective study of UK Armed Forces personnel, combat exposure was similarly associated with PTSD for men and women after adjusting for several potential confounders (e.g., age, rank, service type) (Woodhead et al., 2012). Adjusting for potential confounders, Street et al. (2013) reported the associations between combat exposure and sexual stressors with probable PTSD were similar across genders. However, these findings are based on cross-sectional data, and prospective studies that adjust for relevant baseline factors may help elucidate whether exposure is differentially associated with post-deployment PTSD symptoms for women and men. One prospective study of active duty soldiers deployed to OEF/OIF found the impact of several deployment stressors experiences on PTSD symptoms was similar across gender; only injury experiences were more strongly associated with PTSD symptoms for women than men (Maguen et al., 2012b). It remains unknown whether risk/protective factors present prior to deployment may confer differences in women and men's vulnerability to PTSD following deployment.

A number of risks/protective factors that differ by gender may explain gender disparities in PTSD rates following combat deployment (Brewin et al., 2000; Carter-Visscher et al, 2010; Ozer et al., 2003). For example, female service members and veterans are more likely than their male peers to report a history of sexual trauma (Katz et al., 2012; Zinzow et al., 2007). While prior sexual assault has been shown to increase risk for PTSD symptoms among both women and men deployed to OEF/OIF (Smith et al., 2008b), other research suggests the impact of pre-combat trauma on risk of developing PTSD following combat exposure may be greater for women than men (Engel et al., 1993).

Factors specific to service members' military experiences might also explain apparent gender differences in post-deployment PTSD. For example, women report lower perceived unit support or cohesion both prior to and during deployment than their male peers (Carter-Visscher et al, 2010; Vogt et al., 2005). Unit cohesion has been associated with lower odds of developing PTSD (Iversen et al., 2008) and has been shown to attenuate the association between prior stressors and PTSD (Brailey et al., 2007). Women also report lower perceptions of preparedness for deployment than men (Carter-Visscher et al, 2010), which has been shown to predict new onset of PTSD symptoms (Polusny et al., 2011). Concerns about the impact of deployment on family and civilian life may also play an important role in understanding gender differences in risk for post-deployment PTSD. Service members' concerns about family relationship disruptions during deployment to Gulf War I were more strongly associated with post-deployment mental health for women than men (Vogt et al., 2005).

The present prospective, longitudinal study builds on this literature and examines the extent to which deployment-related stressors and pre-deployment risk/protective factors differentially predict post-deployment PTSD symptoms for women compared to men in a sample of US National Guard soldiers deployed to OEF/OIF. Based on previous research suggesting combat exposure may have a similar impact on men and women, we hypothesized there would be no gender differences in the association between deployment-related stressors and post-deployment PTSD symptoms. We posited pre-deployment risk/protective factors would play an important role in explaining gender differences in post-deployment PTSD symptoms. We planned to examine whether the association between gender and post-deployment PTSD symptoms would remain after accounting for gender differences in other risk/protective factors. Finally, based on cross-sectional research documenting gender differences in the association between some risk/protective factors and post-deployment PTSD symptoms, we hypothesized that associations between pre-deployment risk/protective factors (prior interpersonal victimization, unit support, preparedness for deployment, concerns about life/family disruptions during deployment) and post-deployment PTSD symptoms would be stronger for women compared to men.

## 1. Materials and methods

### 1.1. Design and procedures

Data were examined from a larger prospective, longitudinal investigation of post-deployment mental health in National Guard